

What are outdoor wood boilers?

Outdoor wood boilers are free standing wood burning appliances that heat water, which is then pumped to one or more structures to provide heat. An outdoor wood boiler also can be used to provide hot water year-round to structures and can be used to heat swimming pools and driveways. Units are typically the size and shape of a small storage shed or mini-barn with a short smoke stack on top. They can heat buildings ranging in size from 1,800 to 20,000 square feet or more, depending on the size of the unit. Outdoor wood boilers are much larger and differ in design, operation, and emissions produced from the smaller indoor wood stoves, pellet stoves, fireplaces, and barbecue pits.

Health and environmental effects of wood smoke:

Wood smoke is a primary source of airborne particulate matter. Fine particulate matter (particles smaller than 2.5 microns, or “PM 2.5,” 1/20th the width of a human hair) is a significant health concern. Fine particulate can lodge deep in the lungs and has been linked to significant health problems, including decreased lung function, aggravated asthma, irregular heartbeat, and even premature death. Medical studies also show that individuals with pre-existing medical conditions, in addition to children and older adults, are especially vulnerable to the negative health effects from exposure to fine particulate.



Wood smoke generated by outdoor wood boilers may contribute to a community's violation of the fine particulate health standard. Fine particulate matter is one of the U. S. Environmental Protection Agency's six criteria pollutants for which a health-based air quality standard has been established. If an area within the state, usually by county, has violated the standard or is found to contribute to another area's violation of the standard, it is required to be designated by the U.S. EPA as “nonattainment” for fine particulate. If an area is designated as nonattainment, then state and local governments are required to take additional steps to reduce the amount of that pollutant in the air. These required steps can have potentially significant costs to the larger community. For example, more restrictive air permitting in a nonattainment area can influence expansion plans for local businesses as well as deter new industrial development. Currently, Indiana's fine particulate nonattainment areas include Lake, Porter, Marion, Hamilton, Hendricks, Morgan, Johnson, Clark, Floyd, Vanderburgh, Dubois, and Warrick Counties, as well as portions of Gibson, Pike, Spencer, Jefferson, and Dearborn Counties.

In addition to fine particulate, wood smoke is a source of carbon monoxide, polycyclic aromatic hydrocarbons, and toxic air pollutants, also known as hazardous air pollutants. Hazardous air pollutants are those pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. Examples of hazardous air pollutants include toxic volatile organic compounds such as formaldehyde and benzene.

For more information on the negative health and environmental effects of wood smoke, visit the following web sites:

[EPA: Particulate Matter](http://www.epa.gov/oar/particlepollution/index.html) (<http://www.epa.gov/oar/particlepollution/index.html>)

[EPA: Health effects of wood smoke](http://www.epa.gov/woodstoves/healtheffects.html) (<http://www.epa.gov/woodstoves/healtheffects.html>)

[EPA: About toxic air pollutants](http://www.epa.gov/ttn/atw/allabout.html) (<http://www.epa.gov/ttn/atw/allabout.html>)

How are outdoor wood boilers different from other wood burning appliances?

Outdoor wood boilers are different from other wood burning devices in several ways. Lower stack heights, design differences, and lower combustion temperatures result in more intense smoking and smoldering conditions nearer to ground level than for other wood burning appliances.

Outdoor wood boilers typically have a much higher fuel capacity than other residential wood burning devices. A potential concern is that in some cases, individuals may fully load a unit with oversized capacity in order to extend the unit's operating period between loadings. Operation in this manner results in longer smoldering conditions inside the firebox.

Chimneys from indoor wood burning appliances almost always extend past the roof line of the house and are typically 20 to 30 feet above ground level. Stack heights on outdoor wood boilers are usually in the range of eight to ten feet above ground level. The lower stack heights on outdoor units decrease the opportunity for wood smoke to disperse in the surrounding air before affecting nearby individuals, residences, or other structures.

The basic design of outdoor wood boilers causes fuel to burn incompletely, or smolder, which results in thick smoke and potentially high particulate matter emissions. The firebox in most outdoor wood boilers is surrounded by a water filled jacket. The fire then heats the water, but the presence of this water jacket cools temperatures inside the firebox, causing more incomplete combustion. Incomplete combustion due to lower operating temperatures is the main reason why outdoor wood boilers emit much more particulate matter pollution than other wood burning devices.

U.S. EPA has emissions standards in place for all indoor wood heaters manufactured and sold at retail since 1992, but these standards do not apply to outdoor wood boilers.

Tips to reduce air pollution and nuisance smoke emissions from outdoor wood boilers:

Outdoor wood boilers should be installed, operated, and maintained according to the manufacturer's instructions. Problems with smoke from outdoor wood boilers can sometimes be remedied by requesting assistance from the manufacturer.

When operating an outdoor wood boiler or any other wood burning device, use clean dry wood ONLY. Never burn treated wood, green wood, discarded construction materials,

leaves, paper, cardboard, plastics, or garbage in a wood burning appliance. Never use lighter fluids, gasoline, or chemicals in a wood burning appliance.

When determining an appropriate location to place an outdoor wood boiler, take into consideration how close the unit is to be placed in relation to neighboring properties, especially neighboring residences. Be aware of the direction of prevailing winds and of the contours of the land when deciding where to place an outdoor wood boiler. Consider extending the stack height to direct smoke up above adjacent areas and to give the smoke more room to disperse.

How is IDEM addressing the effects of wood smoke from outdoor wood boilers?

The Indiana Department of Environmental Management is concerned about the potential health and environmental effects outdoor wood boilers may have as this becomes a more popular home heating method. Additionally, IDEM has received numerous complaints concerning smoke from outdoor wood boilers in residential areas.

On December 1, 2005, IDEM published a [first notice of comment period regarding a proposed outdoor wood boiler rulemaking](http://www.IN.gov/legislative/register/Vol29/03Dec/11ID326050332.PDF) (www.IN.gov/legislative/register/Vol29/03Dec/11ID326050332.PDF). The purpose of this first notice is to solicit public input on whether and how to address smoke emissions from outdoor wood boilers in Indiana. The comment period on this first notice was extended to run until March 3, 2006 due to high interest in the rulemaking.

The first notice of comment period identifies alternatives for how the outdoor wood boiler rulemaking process might proceed. These alternatives range from taking no action at all to enacting rules that reduce the impact of smoke from outdoor wood boilers on neighbors and adjacent properties.

Other states are studying the issue of outdoor wood boilers as well. For further information, go to the following links:

[Connecticut fact sheet](http://dep.state.ct.us/air2/consumer/owf.pdf) (<http://dep.state.ct.us/air2/consumer/owf.pdf>)

[New York State report](http://www.oag.state.ny.us/press/2005/aug/August%202005.pdf) (<http://www.oag.state.ny.us/press/2005/aug/August%202005.pdf>)

[Michigan fact sheet](http://www.michigan.gov/deq/0,1607,7-135-3310-85746--,00.html#outdoorwoodboilers) (<http://www.michigan.gov/deq/0,1607,7-135-3310-85746--,00.html#outdoorwoodboilers>)

[Wisconsin fact sheet](http://www.dhfs.state.wi.us/eh/HlthHaz/fs/waterstoves.htm) (<http://www.dhfs.state.wi.us/eh/HlthHaz/fs/waterstoves.htm>)

[Connecticut fact sheet](http://dep.state.ct.us/air2/consumer/owf.pdf) (<http://dep.state.ct.us/air2/consumer/owf.pdf>)

[Vermont information and fact sheets](http://www.vtwoodsmoke.org/index.html)
(<http://www.vtwoodsmoke.org/index.html>)